40180

(12) UK Patent Application (19) GB (11) 2 228 856 (13) A

(43) Date of A publication 12.09.1990

(21) Application No 9001035.6

(22) Date of filing 17.01.1990

(30) Priority data
(31) 303229 (32) 30.01.1989 (33) US

(71) Applicant
Continental Baking Company

(Incorporated in the USA - Delaware)

Checkerboard Square, St. Louis, Missouri 63164, United States of America

(72) Inventors
Robert F Schiffmann
Ernest W Stein

(74) Agent and/or Address for Service
Marks & Clerk
57-60 Lincoln's Inn Fields, London, WC2A 3LS, United Kingdom

(51) INT CL[5]
A21D 13/00, H05B 6/80

(52) UK CL (Edition K)
A2B BKW BMB39 B347 B441 B442 B444 B445 B449
H5H HMQ

(56) Documents cited
US 4190757 A
The Journal of Agricultural and Food Chemistry May 1955 p.424 Cospson et al

(58) Field of search
UK CL (Edition J) A2A, A2B BKC BKW BKX BW, H5H HMQ HMX
INT CL[4] A21D 13/00, H05B 6/80

(54) Packaged brown and serve product for use in microwave

(57) In a packaged brown and serve product, that readily browns upon heating with microwave energy, browning is achieved by the combination of treating at least one surface of the product with an aqueous solution of an edible alkali hydroxide and packaging of the product in a container having a microwave susceptor, overlying but not touching the treated surface of the product.

GB 2 228 856 A

PACKAGED BROWN AND SERVE PRODUCT AND METHOD OF PRODUCING THE SAME

The present invention relates to a packaged brown and serve product which browns on the product surface when heated by means of microwave energy. The present invention also relates to a process for producing a brown and serve product, including the use of a unique composition for the browning of the product when heated with microwave energy prior to serving.

Sales of microwave ovens have undergone tremendous growth in the United States and other developed countries, including the United Kingdom, to the point where they now are extensively used. Usage of the microwave oven for the cooking or heating of foodstuffs has led to extensive development by the food industry of products which are capable of rapid cooking or heating in microwave ovens. However, the unusual manner in which microwave energy heats food products creates difficulties in producing a product which performs comparably with a product that has been cooked in a conventional oven. For example, a gas fired oven may be maintained at temperatures of from 300°F to 400°F (149 to 205°C), at which browning of the surface of the food product during baking or cooking is readily obtained. In contrast, in microwave ovens, the air temperature in the cooking space of the microwave oven is approximately at room temperature. Any rise in temperature in this space is due primarily to heat loss from the food product which is being cooked. Microwave energy interacts with the particles of the food (or with components of those particles) and instantly produces heat within the food mass, which results in the typical rapid cooking obtained by microwave ovens. As

previously noted, however, the low surface temperatures existing in the microwave oven, coupled with evaporative cooling effects that take place on the surface of the food product, limits the crisping or browning of many foods when they are cooked in microwave ovens. Baked products or "brown and serve" products, such as bread or rolls, are a particular problem since these products, when cooked by microwave energy, appear light in colour and generally appear unbaked, even though the interior may have been fully cooked. This limits the preparation of "brown and serve" products by the consumer only to conventional gas or electric ovens, since these products are normally designed to require no cooking except for colour or surface browning.

A number of procedures have been proposed to provide dough-based products that brown when cooked or heated in a microwave oven. U.S. Patent No. 4,448,791 describes a composite dough material which has an unreactive substrate layer, which does not brown upon exposure to microwave energy, and an outer layer of a reactive dough composition, which contains a reducing sugar and an amino acid, that browns upon exposure to microwave cooking. This type of product, however, is complex and difficult to process because of the composite dough layer.

A variety of browning compositions have also been proposed, which, when applied to the surface of the food product, cause browning upon exposure to microwave energy. There are, however, restrictions upon the nature of such compositions, since they must have a flavour and appearance which are compatible with the food product to which they are applied. An example of such a browning composition is disclosed in U.S. Patent No. 4,252,832, which describes an aqueous syrup comprising a caramelized disaccharide. U.S. Patent No.

4,518,618 also describes a coating composition for browning foodstuffs which comprises a combination of three salts, such as potassium acetate, potassium chloride and sodium bicarbonate. The article by Copson et al. in "The Journal of Agricultural and Food Chemistry", May 1955 at p. 424, describes a variety of browning methods using coating compositions comprising mixtures of a reducing sugar and an amino acid, in which sodium carbonate or sodium hydroxide is used to control the pH to about 10 for improved colour development.

An alternative approach to achieving browning in microwave cooking is by the use of a microwave susceptor, which usually comprises a laminate of a support surface, such as paper board, and a foil or metal material which is susceptible to the absorption of microwave radiation and which becomes hot when exposed to microwave radiation. Examples of packages of this type, designed to brown the product in a microwave oven, are disclosed in U.S. Patents No. 4,641,005, 4,661,671 and 4,190,757. Disadvantages of the use of a microwave susceptor are that it must contact the surface of the food product in order to produce browning and that it does not always provide a uniform degree of browning on the product surface.

The present invention provides a packaged "brown and serve" baked product, such as bread or rolls, which browns on the surface when heated with microwave energy and is capable, if so required, of browning uniformly.

Thus, the present invention provides a brown and serve product packaged in a container which has a microwave susceptor adjacent to at least one surface of the product but not in substantial contact therewith, said product having a surface coating produced by treatment with an aqueous solution of an alkali metal

hydroxide prior to packaging.

The product of the present invention preferably comprises a typical "brown and serve" product which has been fully formed and prebaked to the exact size and shape required, except for any desired surface colouration or browning. The brown and serve product of the present invention is also packaged in a container having a microwave susceptor or microwave heater element, which absorbs microwave energy and releases heat. The microwave susceptor layer of the container employed in the present invention is adjacent to a surface of the product but is not in substantial contact therewith, and is preferably not in contact with the product at all. The brown and serve product of the present invention also has at least one surface which has been treated with an aqueous solution of an alkali metal hydroxide, preferably sodium hydroxide or potassium hydroxide. The combination of a microwave susceptor, which does not contact the surface of the product, and this treatment of least one surface of the product, provides a means for uniform browning of brown and serve products in a microwave oven.

The result is a brown and serve packaged product that can be easily and efficiently browned in a microwave oven. It also overcomes the disadvantages of complexity and economics associated with previously proposed procedures for browning during microwave cooking.

The present invention provides a unique means for the browning of a variety of packaged foodstuffs in a microwave oven, although it is intended primarily to apply to dough-based products, such as bread, rolls and pastries, which, if not browned, appear uncooked to the consumer. Preferably, the "brown and serve" products to

which the present invention is applied are rolls, breadsticks, pretzels, breads or pastries or other such products that are fully formed and prebaked to the exact shape and size required, except for surface browning. These products are then designed to be browned by the consumer in their own microwave oven to provide hot bakery products.

The process for producing brown and serve bakery products involves baking yeast-raised products to a point at which they have achieved rigidity and full volume without any degree of browning. Any conventional process for preparing this type of product may also be employed for producing the brown and serve product used in the present invention and the exact manner of preparation of the brown and serve product does not form part of the present invention. However, by way of example, this type of product is typically obtained by a conventional baking process but in which the oven temperature is reduced from its usual higher value to a value of from 230 to 320°F (110 - 160°C) and by properly conditioning the dough so as to minimize the undesirable "oven spring" that normally results from baking this type of product at lower temperatures than normal. Although the following general conditions should not be considered as limiting and may be varied, as is well known in the art, nevertheless, dough consistency for preparing a brown and serve product should be stiffer than normal to promote the desired product rigidity directly from the oven. Straight dough calls for higher mixing temperatures in the range of from 78 to 85°F (25 - 30°C), although sponge dough may be mixed at normal temperatures. Both the yeast and the yeast food employed in the dough should be employed at slightly lower levels than normal to prevent excessive oven spring. Generally a fairly rich formula, especially with respect to shortening and eggs, is preferred, since

those materials contribute to the flavour, aroma and eating quality of the finished product. Baking is normally and preferably carried out within a temperature range of from 230 to 320°F (110 - 160°C) for as long as possible to produce a baked product without the appearance of a brown surface or crust. At this temperature, a baking time of from 15 to 25 minutes would be adequate in most cases to impart a significant degree of rigidity to the product; however, the exact baking time for any particular dough mix may readily be determined by simple trial and error, if it is not already known. The interior temperature of the brown and serve product would typically be at least 170°F (77°C) as the product leaves the oven, otherwise it tends to collapse upon cooling. Following baking of the product, subsequent cooling and packaging of the material is most preferably done under highly sanitary conditions in order, on the one hand, to reduce the possibility of mould development and, on the other hand, to preserve the unique appearance of the product. The procedure described above represents a typical but non-limiting description of a process which may be used to prepare brown and serve products and it is apparent that variations therein or other procedures may be readily carried out and the present invention is not intended to be limited by the specific process used to prepare the baked goods to which the present invention may be applied.

Following preparation of the brown and serve product, it is preferably cooled for a suitable period, e.g. for about 10 - 15 minutes. Then, at least one surface, but typically the top and sides of the prebaked product, is treated with an aqueous solution comprising an edible alkali hydroxide, typically sodium or potassium hydroxide. The solution of alkali hydroxide can be applied by spraying, dipping or brushing on of

the solution, which is applied at a level sufficient to provide browning of the treated surface when the product is heated with microwave energy. This may be determined by routine trial and experiment. Preferably, the solution is applied at a level of at least 1% by weight of the baked product, and more preferably at a level of from 2% to 5% by weight of the product. The solution of alkali hydroxide is preferably prepared by dissolving a suitable amount, e.g. from 1 to 40 grams, and more preferably from 5 to 10 grams, of granular alkali metal hydroxide, e.g. sodium hydroxide, per about 100 grams of water. It is desirable, although not essential, that the aqueous solution of alkali hydroxide include a flavour enhancing amount of an edible sugar, such as dextrose, sucrose, lactose or fructose, or other suitable flavouring material, to improve the flavour of the crust. Preferred amounts of the sugar are from 6.0 to 50.0 grams of sugar per 100 grams of water, with a preferred amount of from 15 to 33 grams of sugar per 100 grams of water.

Following application of the solution of alkali hydroxide, the baked product should preferably be allowed to continue cooling until it reaches about ambient temperature for packaging.

Following treatment with the alkali metal hydroxide, the brown and serve product is then packaged in a container which may be selected from a variety of conventional materials of the type typically employed for the heating and serving of brown and serve products, although an important factor in the present invention is the use of a packaging material which has a microwave susceptor or microwave heater element in the container. A microwave susceptor usually comprises a thin sheet or central layer of a metallic material surrounded by paper based or other packaging material which can be in either

rigid or flexible form. The metal is usually a thin coating of aluminium or a combination of metals having a degree of resistivity; this metal is typically deposited on a polyester or similar substrate, which is then bonded to the paper, paperboard or other dielectric substrate with an adhesive. The polyester substrate may be covered on both sides with the paper or dielectric substrate, if desired. When microwave energy is applied, resistive heating of the metal occurs, thereby generating heat.

One typical type of flexible container is a bag of the kind commonly used for the microwave heating of popcorn, which typically comprises a moisture proof paper and polyester bag with a susceptor layer embedded in one wall of the bag. If a bread loaf is placed in the bag, the susceptor layer overlies the surface to which the composition is applied without being in contact therewith. Alternatively, a more rigid type of microwave susceptor which may be employed in the present invention comprises a thin layer of aluminized film glued to a sheet of paper board, such as that manufactured by the James River Corporation, Neenah, Wisconsin, U.S.A., for example as generally described in U.S. Patent No. 4,641,005. With this type of container it is preferable that the microwave susceptor or heater element be shaped into a cover fitting over a pan which contains the brown and serve product; this microwave susceptor or heater element usually overlays at least one coated surface of the product and it is important for the purposes of the present invention that the microwave susceptor or heater element should not be in substantial contact with the surface of the brown and serve product and preferably should not be in contact with it at all. This is a significant difference between the present invention and those procedures employed previously which involve the use of a microwave

susceptor, since those procedures require that the microwave susceptor be in direct contact with the surface of the product to cause browning during microwave heating. For the most part, direct contact usually causes non-uniform or uneven browning. In the present invention because of the use of a unique coating composition, it is neither desirable nor essential that the microwave susceptor contact the coated or treated surface of the brown and serve product and, in fact, the microwave susceptor preferably does not contact the brown and serve product; indeed, the microwave susceptor can be at a significant distance from the surface of the brown and serve product and still provide uniform browning. Although the exact distance between the susceptor and the surface of the product is not critical to the practice of the present invention, it should preferably be at a distance sufficient to provide an air space for heating, although a typical distance is generally from 1/16 to 1/2 inch (from 0.16 to 1.27 cm). When a packaged brown and serve product having the coating composition of the present invention applied to at least one surface thereof is placed in a container with a microwave susceptor, as described above, and the package is heated in a microwave oven for about two minutes, the product browns very uniformly with a rich brown colour that is not obtainable if only the browning composition, or alternatively only the susceptor layer, is employed.

It is therefore apparent that the combination of the microwave susceptor and browning composition employed in the production of the packaged brown and serve product of the present invention provides a unique and improved means of browning a product of this type in a microwave oven.

The invention is further illustrated by reference to

the following Examples.

EXAMPLE 1

A "brown and serve" bread loaf was prepared using the following ingredients:

	INGREDIENTS	GRAMS
	Seal of Minnesota Bleached & Bromated Flour	490
	Vital Wheat Gluten	6
	Granulated Sugar	44
	Non Fat Dry Milk	30
*	Emplex emulsifier	2
**	US 500 dough conditioner	1.5
	Calcium Propionate	0.5
	Vegetable Shortening	50
***	Durkee Durem 204 Emulsifier	2.8
	Water	250
	Yeast	19
	Salt	10.2
	ADA Yeast Food KC (Optional)	0.5

* Patco Products, 3947 Broadway, Kansas City, MO 64111, USA

** Puratos Corporation, 9242 Commerce Highway, Pennsanken, NJ 08110, USA

*** Durkee Industrial Foods Corp., 925 Euclid Avenue, Cleveland, OH 44115, USA

The ingredients listed above were assembled and mixed with a three speed, 5 quart (4.73 litres) Hobart mixer: one minute at the first speed; 12 to 14 minutes at the second speed. The final dough temperature should

be 78 to 82°F (25 to 28°C).

The dough was then allowed to ferment for between 50 and 60 minutes, after which pieces were cut off and weighed to 175 grams scaling weight.

The dough pieces were then rounded and allowed to stand for 10 minutes, after which they were moulded into the appropriate white bread shape and were then placed in French basket pans. They were allowed to proof for 40 to 45 minutes at 105°F (41°C) (dry bulb), 65 - 90% relative humidity.

Baking was carried out at 255 to 320°F (123 to 160°C) for 18 to 20 minutes in an oven employing bottom heat only, which yielded the desired "brown and serve" loaf. Although the product had been completely baked, no exterior or surface browning of the bread had taken place. The loaves were allowed to cool and were then placed in appropriately sized aluminium foil pans. The finished baked weight should be approximately 160 gms.

The loaf of bread was allowed to cool at room temperature for about 10 - 15 minutes. Following this, the top and sides of the bread were sprayed with a 10% w/w aqueous solution of sodium hydroxide (prepared by dissolving 30 g of granular sodium hydroxide in 300 g of water) until the amount of solution applied comprised about 2% of the finished weight of the baked loaf. The bread was then allowed to continue cooling until it reached ambient temperature.

A piece of 200# corrugated board was cut to conform to the shape of the bottom of a #608 foil pan. The treated bread loaf was then placed into the foil pan, which was then covered with a microwave susceptor layer, as generally described in U.S. Patent No. 4,461,005,

which was cut to the proper size to fit tightly the top of the foil pan. The susceptor layer cover did not contact the surface of the bread loaf. The entire loaf, pan and cover were placed in a 1 mil thick polyethylene bag and sealed.

The packaged "brown and serve" bread, as described above, was removed from the bag and placed into a microwave oven and heated at 600 - 700 watts for 2 to 2.5 minutes. At the end of this time, the surface to which the alkali hydroxide had been applied had a rich brown colour.

EXAMPLE 2

A "brown and serve" whole wheat bread was prepared using the following ingredients:

INGREDIENTS	GRAMS
100% Whole Wheat Flour (fine granulation)	490
Vital Wheat Gluten	20
Granulated Sugar	44
Non Fat Dry Milk	30
Emplex emulsifier	2
US 500 dough conditioner	1.5
Calcium Propionate	0.7
Vegetable Shortening	50
Durkee 204 Emulsifier	3.5
Water	310 - 340
Yeast	23
Salt	10.2

The procedure adopted was as follows:

1. The ingredients were placed in the bowl of a 5 quart (4.73 litres) Hobart mixer and mixed with a dough hook for 2 minutes at Low and 8 - 9 minutes at High speed, for a final dough temperature of from 78 to 80°F (25 to 27°C).

2. The dough was allowed to ferment for 45 minutes.

3. The dough was then rounded and allowed to relax for 10 minutes.

4. After this, it was shaped into loaves at a dough weight of 145 grams for paperboard or 175 grams for foil pans. These were placed on French basket pans.

5. It was then proofed for 30 minutes at 105°F (41°C) (dry bulb); 65 - 75% relative humidity.

6. The loaves were then baked for 20 minutes at 255°F (126°C).

7. After the loaves had been allowed to bake, they were placed in the appropriate paperboard or aluminium foil pans; the finished baked loaf weight will be about 156 - 160 grams for an aluminium foil container and 128 - 130 grams for a paperboard container. A solution of sodium hydroxide was than applied, as described in Example 1, and the loaves were heated as described in Example 1. The loaves, after heating, had an evenly browned surface.

EXAMPLE 3

"Brown and serve" bread loaves were prepared using the following ingredients:

INGREDIENTS	GRAMS
Flour (Bleached and Bromated)	490
Vital Wheat Gluten	8
Granulated Sugar	44
Non Fat Dry Milk	30
Emplex emulsifier	2
US 500 dough conditioner	2
Vegetable Shortening	30
Durkee #204 Emulsifier	2.8
Yeast	15
Salt	12.5
Calcium Propionate	0.5
Water	235

The loaves were produced as described in Example 1, except that the dough pieces after fermentation had a weight of 145 g. The loaves were also placed in a paperboard pan for heating in the microwave oven. The loaves were also baked at 255 - 285°F for 17 - 22 minutes. At the end of this time, the loaves were treated with the alkali hydroxide and heated in a microwave oven as described in Example 2. The surface of the loaves had a rich, brown colour.

CLAIMS

1. A brown and serve product packaged in a container which has a microwave susceptor adjacent to at least one surface of the product but not in substantial contact therewith, said product having a surface coating produced by treatment with an aqueous solution of an alkali metal hydroxide prior to packaging.

2. A product according to Claim 1, in which the alkali hydroxide is at least one of sodium hydroxide and potassium hydroxide.

3. A product according to Claim 1 or Claim 2, in which the aqueous solution comprises from 1 to 40 grams of granular alkali hydroxide for each about 100 grams of water.

4. A product according to Claim 3, in which the solution comprises from 5 to 10 grams of granular alkali hydroxide per 100 g of water.

5. A product according to any one of the preceding Claims, in which the aqueous solution includes a sugar.

6. A product according to Claim 5, in which the solution contains the sugar in an amount of from 6 to 50 grams of sugar per 100 g of water.

7. A product according to any one of the preceding Claims, in which said microwave susceptor does not contact the surface of said product.

8. A method of producing a brown and serve baked product according to any one of the preceding Claims, which comprises;

(a) prebaking a dough to form a brown and serve baked product;

(b) treating at least one surface of said product with an aqueous solution of an alkali hydroxide; and

(c) packaging the coated product in a container having a microwave susceptor adjacent to the treated surface of the product but not in substantial contact therewith.

Published 1990 at The Patent Office, State House, 66 71 High Holborn, London WC1R 4TP. Further copies may be obtained from The Patent Office Sales Branch, St Mary Cray, Orpington, Kent BR5 3RD. Printed by Multiplex techniques ltd, St Mary Cray, Kent, Con. 1/87